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Amdt. Dated January 27, 2004
Reply to Office action of October 27, 2003.

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REMARKS

In the Office Action of October 27, 2003, claims 1-45 were rejected. Claims 1-45 remain pending in the application.

Double Patenting Rejection

The Examiner rejected claims 1-45 under the judicially created doctrine of obviousness-type patenting over claims 1-12, 15-33, 39-49, 62 and 53 of US Patent 6,365,710 (Wang et al.). The Applicant respectfully traverses this rejection.

US Patent 6,365,710, which like the instant application, is assigned to the General Electric Company, claims a method for removing volatile components (water, solvents) from a solid polymeric material, said method comprising:

Step (A) introducing a solid polymeric material comprising water into an extruder, said extruder comprising;

- (i) a primary kneading and melting section, said primary kneading and melting section consisting essentially of forward flighted kneading elements and optionally, forward flighted conveying elements;
- (ii) a first vacuum vent located downstream of said primary kneading and melting section;
- (iii) a secondary melt kneading section located downstream of the first vacuum vent; and
- (iv) a second vacuum vent located downstream of said secondary melt kneading section;

Step (B) heating and shearing said polymeric material in said primary kneading and melting section to form a polymer melt comprising water;

Step (C) removing a portion of the water from the polymer melt through said first vacuum vent to form a partially devolatilized polymer melt;

Step (D) subjecting the partially devolatilized polymer melt to additional melt kneading in a secondary melt kneading section; and

Step (E) removing an additional amount of water from the partially devolatilized polymer melt at said second vacuum vent.

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Thus, as recited in its broadest claim, US Patent 6,365,710 claims a method for the removal of water from a polymer by extruding the polymer on an extruder possessing each of sub-elements (i)-(iv) listed above. US Patent 6,365,710 discloses that when "forward flighted" screw elements only are employed in the primary kneading and melting section of the extruder, higher throughput of the wet polymer can be achieved because the "forward-flight" only screw design prevents steam formed as the wet polymer melts from flowing upstream along the barrel of the extruder and emerging at the feed throat of the extruder and creating a throughput limiting condition at the feed throat of the extruder called "powder bridging" (See the description of Comparative Example 1, column 13, lines 18-34). With the "forward-flight" only screw design, steam formed as the polymer melts is directed downstream toward a plurality of downstream vacuum vents. This allows a much more efficient use of the extruder as evidenced by higher throughput and torque.

The broadest claim (claim 1) of the instant invention recites a method for removing volatile components from a polymer powder, said method comprising:

Step (A) introducing a polymer powder comprising water into an extruder, said extruder comprising;

- (i) a powder conveying section;
- (ii) a powder seal section located downstream of said powder conveying section;
- (iii) a kneading and melting section located downstream of said powder seal section; and
- (iv) a vacuum vent located downstream of said kneading and melting section;

Step (B) conveying the polymer powder through said powder seal section;

Step (C) heating and shearing the polymer powder in said kneading and melting section to form a polymer melt comprising water; and

Step (D) subjecting said polymer melt to vacuum venting at said vacuum vent.

In the instant invention, the problem of throughput-limiting backflow along the extruder barrel is solved in a manner different from that recited in US Patent 6,365,710. In the instant invention, instead of relying on a "forward-flight only" screw design to

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prevent backflow, the Applicant has shown that a "powder seal" may be used to suppress the upstream flow of water and other volatiles, which if allowed to occur would severely limit throughput due to the effects of "powder bridging" and like phenomena at the extruder feed throat. Thus, while both US Patent 6,365,710 and the instant Application claim methods aimed at the same result, the more efficient removal of water and other volatiles from polymers, the methods employed are quite different. Critical inventive elements found in US Patent 6,365,710, are not found in the instant Application and vice versa. The Applicant has provided a detailed description (paragraph 40) of how the backflow-preventing powder seal is formed in the extruder and how it functions. The powder seal technique of the instant invention is clearly different from the "forward flighted" screw design employed in US Patent 6,365,710, and the differences between the two techniques are clearly delineated in the claims of each.

The Applicant thus believes that claims 1-45 recite subject matter which is patentable over US Patent 6,365,710 and urges that the rejection of claims 1-45 on the basis of double patenting be withdrawn.

35 U.S.C. § 102 Rejections

Claims 1, 2, 6, and 14 were rejected as being anticipated by Taylor et al., US Patent 5,079,307. The rejection of claims 1, 2, 6, and 14 is respectfully traversed. First, the Examiner urges that the Taylor reference discloses each and every element of the Applicant's claim 1. The Examiner cites column 2, lines 18-22 as disclosing the removal of volatile components from a polymer powder. The lines referred to describe the reaction in an extruder of a salt formed from the monomeric components of a nylon to afford a "prepolymer", as the preceding paragraph makes clear (col. 2, lines 8-17). It is during the formation of this "prepolymer" that the Taylor patent makes its only reference to a "powder seal" (column 2, lines 20-21). Taylor et al. provide no details of how the extruder is configured during the formation of the prepolymer except to say that a powder seal is present.

Taylor et al. disclose that it is in a second extrusion step that the prepolymer is converted to high molecular weight polymer on an extruder configured as shown in Figure 1 (col. 2, lines 53-55 and col. 3, lines 48-51). Figure 1 does not show a powder

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seal element. The Examiner refers to Figure 1 in the Taylor reference as disclosing each of (i) a powder conveying section ("Figure 1, barrel section 1"), (ii) a powder seal section located downstream of the powder conveying section ("Figure 1, melt seal between barrel sections 1 and 2") as well as (iii) a kneading and melting section located downstream of said powder seal section; and (iv) a vacuum vent located downstream of said kneading and melting section. The Examiner appears to be equating a "powder seal" with a "melt seal." Those skilled in the art will appreciate that these two types of seals are fundamentally different and are not interchangeable. Figure 1 shows a melt seal positioned upstream of a liquid injection point through which an aqueous solution of additional amine is added to the extruder. The additional amine is required to convert the prepolymer into high molecular weight nylon (col. 4, lines 11-14). The melt seal pictured "upstream" of the injection point of the aqueous amine illustrates how Taylor might overcome backflow of steam to the feed throat of the extruder. Taylor does not however disclose overcoming backflow of steam or other volatiles through the use of a powder seal.

Regarding dependent claims 2, 6, and 14, because Taylor et al. do not disclose the key limitations of independent claim 1, namely a powder seal section located downstream of a powder conveying section; a kneading and melting section located downstream of said powder seal section; and a vacuum vent located downstream of said kneading and melting section, it cannot be read to include all of the limitations of claims dependent from claim 1.

Because, Taylor et al. do not disclose each and every element of claims 1, 2, 6, and 14 the Applicant respectfully requests that the rejection of these claims under 35 U.S.C. 102(b) as being anticipated by Taylor et al. be withdrawn.

35 U.S.C. § 103 Rejections

Claims 3, 4, 8, and 9 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor et al. in view of Umemura et al. US Patent 4,845,193. Each of these rejections rests upon the 102(b) rejection of independent claim 1. The Applicant urges that the rejection of claim 1 under 35 U.S.C. 102(b) was in error, the rejection being based on the Examiner's view that Figure 1 of the Taylor reference shows an

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extruder configured with a powder seal. As noted above, Figure 1 does not show a powder seal, only a melt seal. Thus, Taylor et al. do not teach each and every element of the Applicant's invention and the rejection of claim 1 under 102(b) must fall and along with it the rejections of claims 3, 4, 8, and 9 under 35 U.S.C. 103(a). The Applicant thus respectfully requests that the rejection of claims 3, 4, 8, and 9 under 35 U.S.C. 103(a) be withdrawn.

Dependent claims 5, 10-12, 15, 26-28 and 31 were similarly rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor et al. in view of Hosomi et al., US Patent 5,717,055. As noted above, the Applicant respectfully submits that the rejection of claim 1 under 35 U.S.C. 102(b) should be withdrawn. Hence the rejection of claims 5, 10-12, 15, 26-28 and 31 under 35 U.S.C. 103(a) should also be withdrawn.

Dependent claims 7 and 13 were similarly rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor et al. in view of Andersen et al., US Patent 5,232,649. Here again the 103(a) rejection cannot be sustained in light of the arguments made above regarding claim 1. The Applicant thus respectfully requests that the rejection of claims 7 and 13 under 35 U.S.C. 103(a) be withdrawn.

Claim 16 was rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor et al. in view of Hosomi et al. as applied to claims 1 and 15, and further in view of Umemura et al. The Applicant contends that the rejection of claim 1 under 35 U.S.C. 102(b) is in error and should be withdrawn. Here again the 103(a) rejection cannot be sustained independently of claim 1. The Applicant thus respectfully requests that the rejection of claims 7 and 13 under 35 U.S.C. 103(a) be withdrawn.

Claim 17 was rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor et al. in view of Todt et al., US Patent 6,599,446. The Applicant respectfully traverses the rejection of claim 17 under 35 USC 103(a) as being unpatentable over Taylor et al. in view of Todt et al. Claim 17 depends from claim 1, which the Applicant believes to be allowable for the reasons described above. It is therefore submitted that claim 17 is allowable because each depends from an allowable independent claim. Furthermore, Todt et al., commonly owned with the present application at the time the present invention was made, qualifies as prior art only under 35 U.S.C. 102(e)/103(a). The

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instant application has a filing date after November 29, 1999, and it is thus respectfully submitted that Todt et al. should be excluded as prior art in a 35 USC 103(a) rejection, in light of 35 USC 103 (c). MPEP § 706.02 (I)(1). The Applicant thus requests that the rejection of claim 17 be withdrawn.

Claims 18-25 were rejected under 35 USC 103(a) as being unpatentable over Taylor et al. and Todt et al. as applied to claims 1 and 17 and further in view of Wang et al. US Patent 6,365,710. The Applicant respectfully points out that Wang et al. was commonly owned with the present application at the time the present invention was made, and that Wang et al. qualifies as prior art only under 35 U.S.C. 102(e)/103(a). The instant application has a filing date after November 29, 1999, and it is thus respectfully submitted that Wang et al. should be excluded as prior art in a 35 USC 103(a) rejection, in light of 35 USC 103 (c). MPEP § 706.02 (I)(1). The Applicant thus requests that the rejection of claims 18-25 be withdrawn.

Claim 29 was rejected under 35 USC 103(a) as being unpatentable over Taylor et al. and Hosomi et al. as applied to claims 1, 26, and 28 and further in view of Todt et al. As noted, the Todt reference is an improper prior art reference since it qualifies as prior art only under 102(e)/103(a) and is excluded under 35 USC 103(c). The Applicant thus request that the rejection of claim 29 be withdrawn.

Claim 30 was rejected under 35 USC 103(a) as being unpatentable over Taylor et al., Hosomi et al., and Todt et al. as applied to claims 1, 26, 28 and 29, and further in view of Wang. The Applicant has demonstrated that both Todt et al. and Wang may not be relied upon by the Examiner to construct an obviousness rejection under 35 USC 103(a). The Applicant thus request that the rejection of claim 30 be withdrawn.

Claims 32-34, 36-39, and 42-45 were rejected under 35 USC 103(a) as being unpatentable over Taylor et al., in view of Umemura et al., and in further view of Hosomi et al.. The Applicant respectfully traverses this rejection. Independent claim 32 is closely allied to claim 1 of the and recites:

A method for removing water and methylene chloride from bisphenol A polycarbonate powder, said method comprising:

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Step (A) introducing bisphenol A polycarbonate powder comprising water and methylene chloride into an extruder, said extruder comprising;

- (i) a powder conveying section;
- (ii) a powder seal section located downstream of said powder conveying section;
- (iii) a kneading and melting section located downstream of said powder seal section; and
- (iv) a vacuum vent located downstream of said kneading and melting section;

Step (B) conveying said bisphenol A polycarbonate through said powder seal section;

Step (C) heating and shearing said bisphenol A polycarbonate powder in said kneading and melting section to form a polymer melt comprising water and methylene chloride;

Step (D) subjecting said polymer melt to vacuum venting at said vacuum vent.

As noted, Taylor et al. do not show the presence of a powder seal in Figure 1, nor do Taylor et al. discuss powder seals in any context other than the preparation of the "prepolymer". The prepolymer is subsequently passed through an extruder configured as shown in Figure 1. Taylor et al. neither disclose nor suggest the configuration of the powder seal comprising extruder used according to the method of the instant invention. Taylor et al. neither disclose nor suggest the relationship between of the key claim elements related to the powder seal; namely a powder seal section located downstream of a powder conveying section; a kneading and melting section located downstream of said powder seal section; and a vacuum vent located downstream of said kneading and melting section. Because Taylor cannot be read to disclose or suggest the key limitations of the instant invention with respect to the powder seal, a combination of Taylor et al.

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with one or more secondary references which themselves do not disclose said key limitations with respect to the powder seal, cannot logically establish prima facie obviousness of the Applicant's invention. Because neither Taylor et al. nor the secondary references cited by the Examiner disclose the key limitations of the instant invention with respect to the powder seal, the Applicant respectfully request that the rejection of claims 32-34, 36-39, and 42-45 under 35 USC 103(a) as being unpatentable over Taylor et al., in view of Umemura et al., and in further view of Hosomi et al. be withdrawn.

Claims 35, 40 and 41 were rejected under 35 USC 103(a) as being unpatentable over Taylor et al., Umemura et al., and Hosomi et al. as applied to claim 32 and further in view of Andersen et al. As noted above, neither Taylor et al. nor the secondary references cited disclose the key limitations of the instant invention as recited in claim 32 with respect to the powder seal. Thus, the combination of Taylor et al. with Umemura et al., Hosomi et al., and Andersen et al. cannot be construed to disclose or suggest the Applicant's invention. The Applicant thus respectfully request that the rejection of claims 35, 40 and 41 under 35 USC 103(a) be withdrawn.

In view of the foregoing arguments, the Applicant believes that each of claims 1-45 is now in condition for allowance. The Applicant thus courteously solicits a prompt allowance of these claims. Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact the Applicant's undersigned representative at the telephone number below.

Respectfully submitted,


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